

## Photocatalytic Oxidation of Gaseous Formaldehyde Using the TiO<sub>2</sub> Coated SF Filter

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**Abstract :** The research work covered in this study includes the morphological structure and optical properties of TiO<sub>2</sub>-coated silk fibroin (SF) filters at 2.5% wt. TiO<sub>2</sub>/vol. PVA solution. SEM micrographs revealed the fibrous morphology of the TiO<sub>2</sub>-coated SF filters. An average diameter of the SF fiber was estimated to be approximately 10 $\mu$ m. Also, it was confirmed that TiO<sub>2</sub> can be adhered more on SF filter surface at higher TiO<sub>2</sub> dosages. The activity of semiconductor materials was studied by UV-VIS spectrophotometer method. The spectral data recorded shows the strong cut off at 390 nm. The calculated band-gap energy was about 3.19 eV. The photocatalytic activity of the filter was tested for gaseous formaldehyde removal in a modeling room with the total volume of 2.66 m<sup>3</sup>. The highest removal efficiency (54.72  $\pm$  1.75%) was obtained at the initial formaldehyde concentration of about 5.00  $\pm$  0.50ppm.

**Keywords :** photocatalytic oxidation process, formaldehyde (HCHO), silk fibroin (SF), titanium dioxide (TiO<sub>2</sub>)

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